

Parametric Evaluation of Potential Missions for Advanced Propulsion

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One persistent difficulty in evaluating the myriad advanced propulsion concepts proposed over the last 60 years is a true apples to apples comparison of the expected gain in performance. This analysis is complicated by numerous factors including, multiple missions of interest to the advanced propulsion community, the lack of a credible closed form solution to ‘medium thrust’ trajectories, and lack of detailed design data for most proposed concepts that lend credibility to engine performance estimates.

This paper describes a process on how to make fair comparisons of different propulsion concepts for multiple missions over a wide range of performance values. The figure below illustrates this process. This paper describes in detail the process and outlines the status so far in compiling the required data. Parametric data for several missions are calculated and plotted against specific power-specific impulse scatter plots of expected propulsion system performance. The overlay between required performance as defined by the trajectory parametrics and expected performance as defined in the literature for major categories of propulsion systems clearly defines which propulsion systems are the most apt for a given mission.

